

What we claim is:

1. A method for altering the index-of-refraction of an optical material, the method comprising irradiating a planar optical structure comprising a photosensitive material with light at a wavelength appropriate to shift the index-of-refraction of the photosensitive material, wherein the light is not patterned.
2. The method of claim 1 wherein the irradiating of the planar optical structure is performed simultaneously.
3. The method of claim 1 wherein the irradiating of the planar optical structure is performed by moving a path of the light relative to the optical structure to cover the extended area.
4. The method of claim 1 wherein the irradiating of the planar optical structure comprises irradiating an extended area of the optical structure with no segment connecting two point on the perimeter of the extended area passing through the geometric center being less than about 10 microns in length.
5. The method of claim 1 wherein the irradiating of the planar optical structure comprises irradiating an extended area of the optical structure with no segment connecting two point on the perimeter of the extended area passing through the geometric center being less than about 0.1 millimeters in length.
6. The method of claim 1 wherein the irradiating of the planar optical structure comprises irradiating an extended area of the optical structure with no segment connecting two point on the perimeter of the extended area passing through the geometric center being less than about 0.25 millimeter in length.

7. The method of claim 1 wherein the irradiating of the planar optical structure comprises irradiating substantially an entire layer of the planar optical structure approximately uniformly to shift the index-of-refraction of the layer.
8. The method of claim 1 wherein the irradiating of the planar structure comprises irradiating a portion of an entire layer of the planar optical structure approximately uniformly to shift the index-of-refraction of the portion of the layer.
9. The method of claim 1 wherein the wavelength of light is in the ultraviolet portion of the electromagnetic spectrum.
10. The method of claim 1 wherein the wavelength of light is in the visible portion of the electromagnetic spectrum.
11. The method of claim 1 wherein the shift in index-of-refraction is by at least about 1.0×10^{-6} index units.
12. The method of claim 1 wherein the shift in index-of-refraction is by at least about 5.0×10^{-4} index units.
13. The method of claim 1 wherein the photosensitive material comprises germanium.
14. The method of claim 13 wherein the photosensitive material further comprises hydrogen.
15. The method of claim 1 wherein the photosensitive material comprises at least about 1 mole percent germanium with respect to the total metal/metalloid content of the material.
16. The method of claim 1 wherein the photosensitive material comprises an element selected from the group consisting of tin, cerium, praseodymium and europium.

17. A method for producing a gradient in index-of-refraction in an optical material comprising a photosensitive optical material, the method comprising irradiating the photosensitive optical material to create a light-induced gradient in index-of-refraction.
18. The method of claim 17 wherein the optical material comprises a planar optical structure.
19. The method of claim 18 wherein the gradient in index-of-refraction is oriented along the plane of the structure.
20. The method of claim 18 wherein the gradient in index-of-refraction is oriented perpendicular to the plane of the structure.
21. The method of claim 17 wherein the optical material comprises an optical fiber preform or portion thereof with an aspect ratio of at least about 5.
22. The method of claim 17 wherein the photosensitive optical material comprises at least about 1 mole percent germanium as a fraction of the total metal/metalloid content of the photosensitive optical material.
23. The method of claim 17 wherein the irradiating of the photosensitive optical material is performed for a selected period of time with light having an intensity and wavelength to induce the gradient index-of-refraction along the irradiation direction.
24. The method of claim 23 wherein the light intensity and the composition of the photosensitive material produce absorption of the light in the linear Beer's law regime of spatial variation.
25. The method of claim 23 wherein the light intensity and the composition of the photosensitive material produce absorption of the light with non-linear spatial variation.

26. The method of claim 17 wherein the photosensitive optical material comprises a gradient in composition of a dopant that induces photosensitivity of the material wherein the composition gradient results in the index-of-refraction gradient following illumination.
27. The method of claim 17 wherein the gradient in index-of-refraction extends across a distance of at least about 10 microns.
28. The method of claim 17 wherein the gradient in index-of-refraction is at least about 1×10^{-8} index units per micron.
29. A method for altering a pattern in index-of-refraction in an optical material, the method comprising irradiating with light at least a portion of an optical material wherein the at least a portion of optical material comprises a composition variation resulting in a spatial pattern of photosensitive optical material and wherein absorption of the light shifts the index-of-refraction of the irradiated photosensitive optical material to produce an altered pattern of index-of-refraction.
30. The method of claim 29 wherein the irradiating of the portion of the optical material comprises simultaneously irradiating an extended portion of the optical material with no segment connecting two point on the perimeter of the area passing through the geometric center being less than about 0.1 millimeters in length.
31. The method of claim 29 wherein the irradiating of the portion of the optical material comprises moving the light relative to the optical material to irradiate the desired portions of the optical material.
32. The method of claim 29 wherein the optical structure comprises a planar optical structure.
33. The method of claim 29 wherein the pattern of photosensitive optical material is patterned in the form of one or more light paths through the optical material.

34. The method of claim 29 wherein the at least a portion of the optical material subjected to the irradiating with light is a fraction of the optical material wherein the remaining portion of the optical material not subjected to irradiating with light comprises photosensitive optical material.

35. The method of claim 29 wherein the remaining portion of the optical material comprises a pattern of photosensitive optical material.

36. The method of claim 29 wherein the light is patterned.

37. The method of claim 29 wherein the irradiating of the photosensitive material results in the formation of an optical core material surrounding a cladding material that is effective to transmit optical light within the optical core.

38. The method of claim 37 wherein the at least a portion of the optical material subjected to the irradiating with light is a fraction of the optical material, wherein the remaining portion of the optical material not subjected to irradiating with light comprises photosensitive optical material.

39. The method of claim 37 wherein the irradiating of the photosensitive material results in the selection of optical pathways within the optical material.

40. An optical structure comprising a photosensitive optical material wherein at least a portion of the photosensitive optical material has a light-induced index-of-refraction change that is not patterned.

41. The optical structure of claim 40 wherein the optical structure comprises planar optical material.

42. The optical structure of claim 41 wherein the photosensitive material forms a cladding material surrounding a core material having a higher index-of-refraction, the cladding material or a portion thereof having an electromagnetic radiation-induced, shifted index-of-refraction.

43. An optical structure comprising a photosensitive optical material with a light-induced gradient in index-of-refraction.

44. The optical structure of claim 43 wherein the photosensitive optical material comprises a gradient in composition of a dopant that induces photosensitivity.

45. An optical structure comprising a pattern of photosensitive optical material wherein at least a portion of the photosensitive material has a light-induced shift in index-of-refraction.

46. The optical structure of claim 45 wherein only a part of the photosensitive optical material has a light-induced shift in index-of-refraction.

47. The optical structure of claim 45 wherein the photosensitive optical material with a light-induced shift in index-of-refraction forms an optical core within the optical structure.

48. The optical structure of claim 45 wherein the optical structure comprises planar optical materials.

49. The optical structure of claim 48 wherein at least a portion of the photosensitive optical material is covered by an optical material that transmits light with a wavelength effective to shift the index-of-refraction of the photosensitive material.

50. A method for fabricating a material, the method comprising:

fracturing a silicon oxide material by implanting impurities within a silicon oxide material to form a fracture band with a thin transfer layer of silicon oxide above the fracture band; and

transferring the transfer layer to a substrate by associating the substrate with the silicon oxide material at the transfer layer.

51. A method of cleaving a layer from a material, the method comprising:

implanting impurities within the material to form a fracture band with a transfer layer above the fracture band at the surface of the material; and

directing light at the material wherein the light is primarily transmitted through the transfer layer and significantly absorbed by the impurities in the fracture band.

52. A silicon oxide material having a fracture band of impurities below the surface of the material.